Non-Circular Fiberglass Pipe Rehabilitation

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Hobas Pipe USA

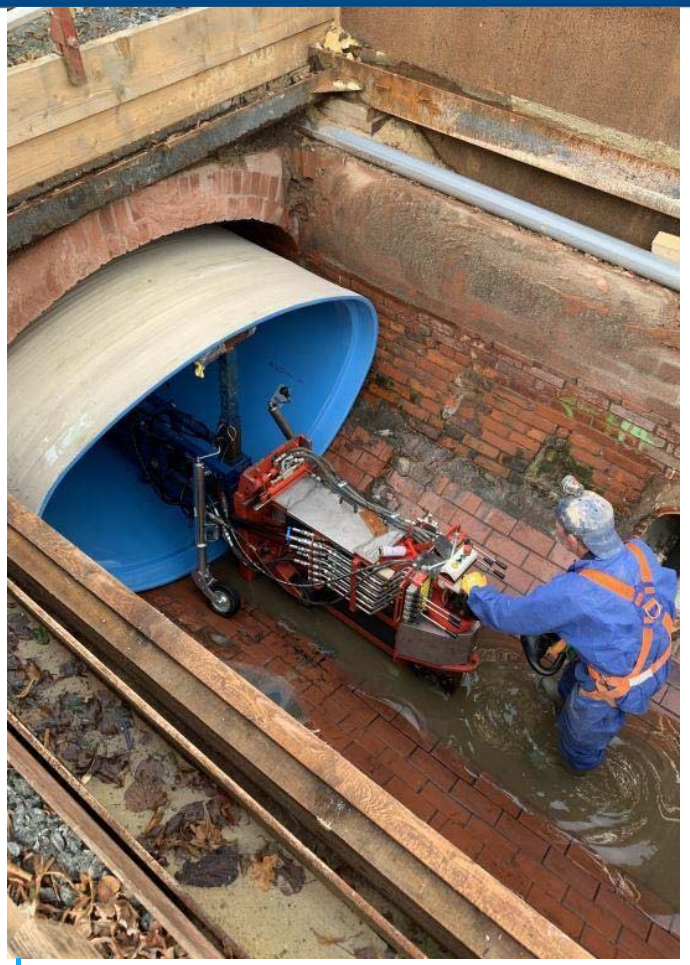
Introduction

- Started by Amiblu in Poland.
- Starting production Summer 2020 in Houston!
- Can make any non circular shape (egg, arch, mouth etc...)
- Sizes range between 18” & 154”.
- Typical lengths are ~ 8 ft to 10 ft in length.

600 ft of 58” x 78” Egg Shape GRP in Germany.

Benefits

- Similar benefits to Hobas Circular Pipes
  - Long expected service life
  - Long term structural solution
  - Can be installed with live flow.
  - Inherent resistance to sulfuric acid



1,000 LF of 89” x 52” Mouth Shape GRP in Germany.

Benefits

Hydraulics

- Increased flow capacity due to better hydraulics for NC sewers.
  - Maximize area
  - Low flow coefficient

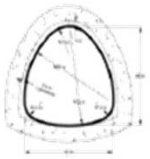
$$Q = \left(\frac{1.49}{n}\right) \cdot A \cdot R^{2/3} \cdot S^{1/2}$$

where, Q = Flow (ft^3/s)
n = Manning's flow coefficient
A = Flow Area -full capacity (ft^2)
S = Sewer slope (ft./ ft.)
R = A / Wetted Perimeter (ft.)

Relative flow capacity of two different sewer pipes installed on the same slope ($S_1 = S_2$) can be expressed as:

$$\frac{Q_1}{Q_2} = \frac{n_2}{n_1} \times \frac{A_1}{A_2} \times \left(\frac{R_1}{R_2}\right)^{2/3}$$

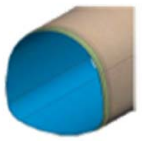
Hobas NC (Q1)	
A (in^2) =	3,241
P (in)=	207.0
R (in)=	15.66
n' value:	0.009



Size: 7' "Horseshoe" Shape	
A (in^2) =	4,067
P (in)=	235.0
R (in)=	17.3
n' value:	0.014

$\frac{Q_1}{Q_2} = 1.160$ → ***16.0%*** Increase in Capacity

Hobas NC (Q1)	
A (in^2) =	4,897
P (in)=	251.0
R (in)=	19.51
n' value:	0.009



Size: 7' "Nail" Shape	
A (in^2) =	6,058
P (in)=	284.8
R (in)=	21.3
n' value:	0.014

$\frac{Q_1}{Q_2} = 1.187$ → ***18.7%*** Increase in Capacity

Culvert in the UK

Installations

- Sliplining
  - Rehab deteriorated non-circular sewers
  - Pipe designed to closely match host's shape.
- Direct Bury (Open Trench)
  - Culverts
  - Extensions of existing non-circular channels

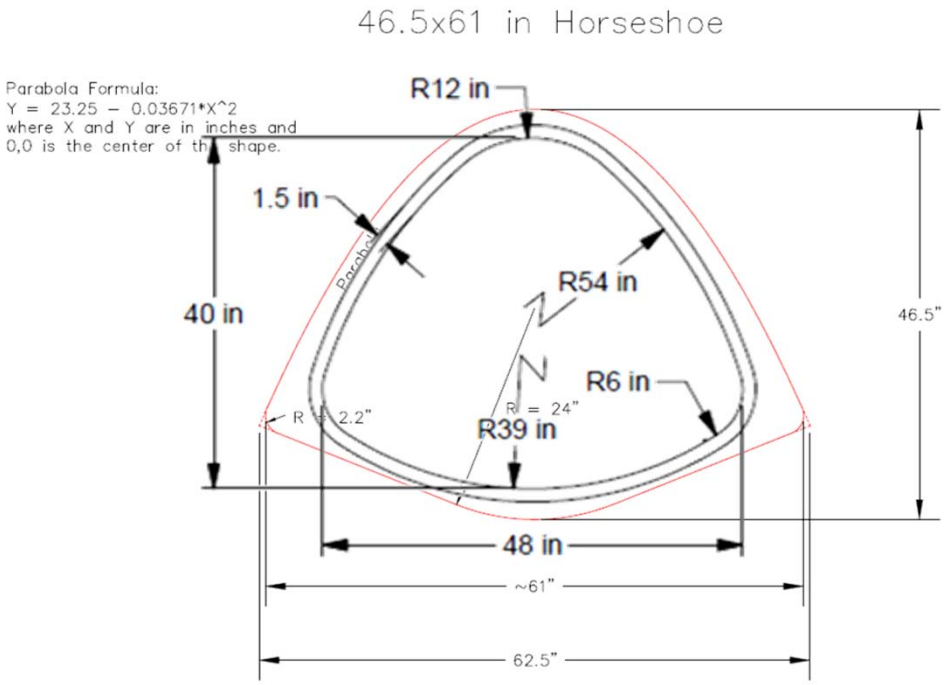
Engineering Design

Shape Considerations

- Evaluate host shape and alignment
- Minimize flat curves
- Maximize tight corners
- Tangential transitions from each curve.

Design Thickness

- Finite Element Analysis



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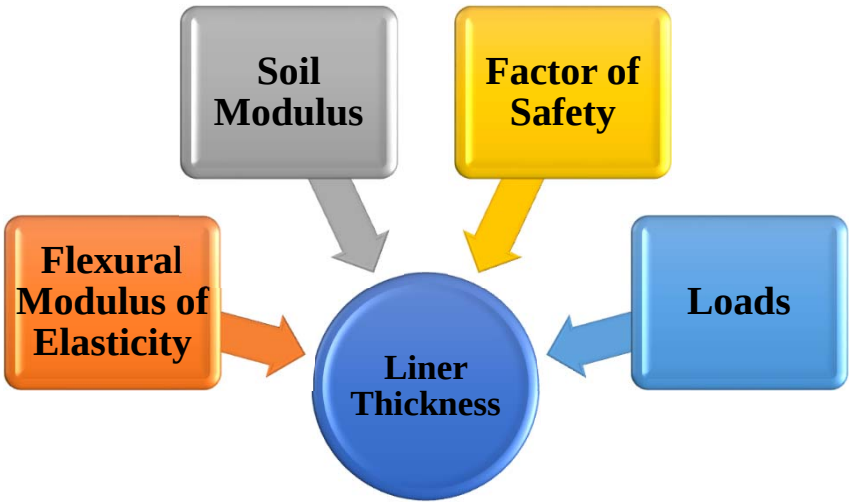


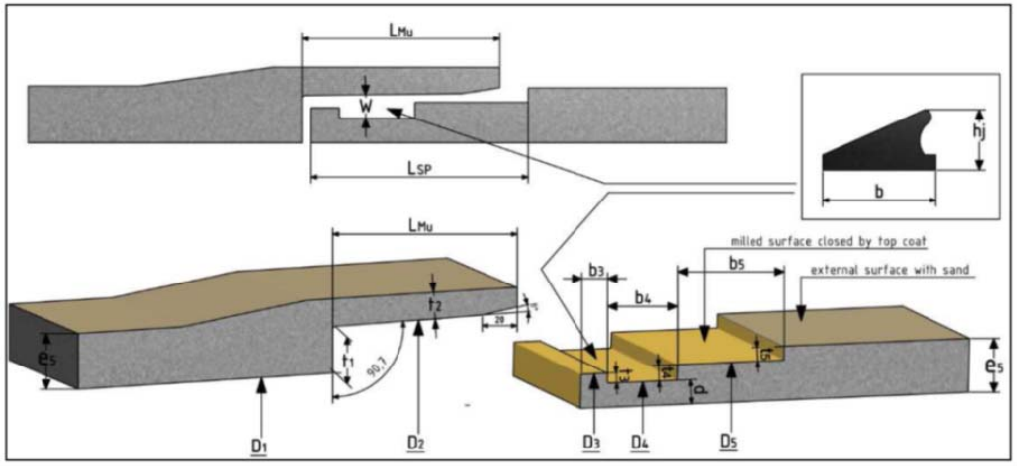
Production Process

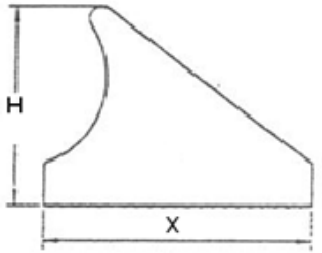
Computer controlled filament winding on a steel mold

Joint System

Low Profile Bell & Spigot

- **Gasket Type:** Flexible EPDM or Nitrile rubber.
- **Leak tightness :** Test realized according to ISO 16611 on Circular samples & ASTM D4161.
- **Tests:** performed at 2 bars internal pressure.
- **NC is designed for non-pressure applications.**





Installation

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Installations

Live Sewer

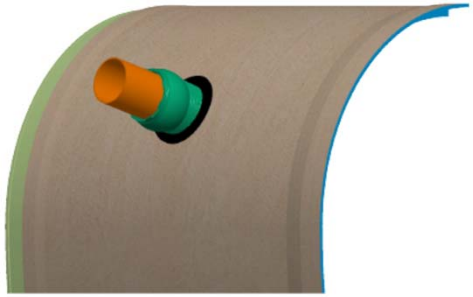
- Drop pipe into shaft (bell trails)
- Clean bell & spigot
- Assemble pipes
- Place push ring on bell end.
- Push or pull pipe inside host
  - Note: do not apply force on bell.

West Los Angeles Interceptor Sewer
(WLAIS) Kelton to Overland
1650 LF of 58” x 52”

Installation

Laterals & Grouting

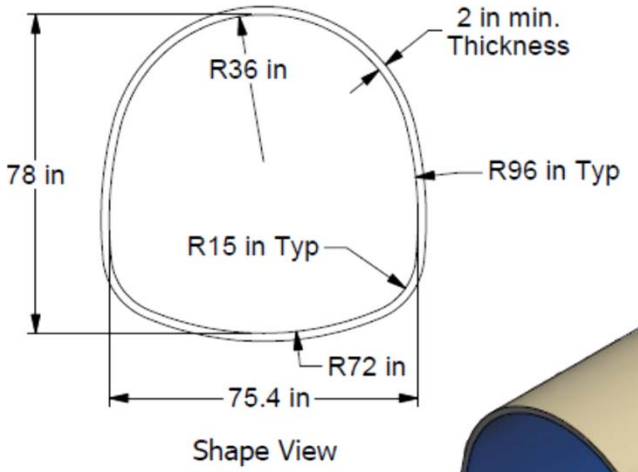
- Re-instate laterals
  - Typically done by small point excavations via inserta-tee.
  - Could be done inside with magnets and top hat CIPP
- Grouting:
  - Seal the ends with concrete bulkheads
  - Divert flow inside the pipe
  - Inject grout till refusal.
    - Control grout pressure on pipe.



CWWTP Influent Structures Rehab

Dallas Water Utilities

- 1800 LF of 75” x 78” Hobas NC
- Dallas Water Utilities
- 3 lateral connections
- Live sliplining
- Production ~Summer 2020.



Shape View